Community Associated MRSA: Fort Benning, Georgia

JAN 2001-MAR 2005

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Abstract

Background: An increasing number of community associated methicillin resistant Staphylococcus aureus (CA-MRSA) skin and soft tissue infections have been noted in military communities. Soldiers who train and work in close proximity under stressful conditions and their contacts are particularly vulnerable.

Methods: MRSA cases occurring among soldiers at Ft. Benning GA were tracked by the Martin Army Community Hospital's infection control nurse from Jan 2001 – Mar 2005. Antibiotic susceptibility of the MRSA isolates was also evaluated.

Results: A total of 1174 MRSA confirmed skin and soft tissue infections occurred over the 4 year period, affecting 1040 soldiers. With each consecutive year disease occurrence increased and peaked earlier in the year. A clustering of cases by unit was noted. Wounds were predominately located on the elbows and knees and presumed by 11% of cases to be spider bites. Of the 27 antibiotics tested for MRSA susceptibility, the majority were found to have high or questionable resistance levels; trimethoprim-sulfamethoxazole and vancomycin were found to be the most effective. Approximately 40% of cases were prescribed Keflex which is ineffective against MRSA.

Conclusion: The continued and steady increase of CA-MRSA cases at Ft. Benning highlights the need for more vigilant preventive measures at basic training sites. Educating soldiers to differentiate MRSA infections from insect bites; training clinic staff to administer tailored patient histories and appropriate antibiotic treatments for suspected MRSA cases; enforced hygienic practices among trainees; disinfection of common surfaces; and enhanced surveillance that includes sensitivity testing of suspected isolates could safeguard against further infection.

Background

The majority of Methicillin Resistant Staphlococcus Aureus (MRSA) infections occur among patients in hospitals or other healthcare settings; however, it is becoming more common in the community setting. Data from a prospective study in 2003, suggests that 12% of clinical MRSA infections are community-associated (CA-MRSA), but this varies by geographic region and population.

Risk factors for infection with CA-MRSA strains include recent exposure to antibiotics, poor hygiene/sanitation, physical stress, and membership in groups with close and extended physical proximity (eg. amateur or professional athletic teams, prison populations, or military training populations).

An increasing number of CA-MRSA skin and soft tissue infections have been noted at Army Medical Treatment Facilities (MTFs), particularly among basic training posts such as Ft. Benning GA. Characteristics of several significant outbreaks at Ft Benning over the period of 2001-2005 are described.

Methods

MRSA cases among active duty (AD) soldiers at Ft. Benning, GA, were tracked by an infection control nurse at the Martin Army Hospital from Jan 2001 – Mar 2005.

The MHS Mart (M2) was queried to determine the monthly population for active duty soldiers stationed at Ft. Benning, GA, dating back to Jan 2003.

Date of positive MRSA culture and monthly population data were used to generate monthly MRSA infection rates from Jan 2003 – Mar 2005.

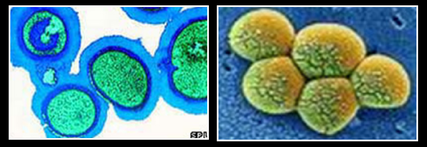
Descriptive analysis of data gathered (e.g. patient demographics, wound locations and antibiotic susceptibility patterns) was performed.

MRSA - Case Definition

A case was defined as an individual with both of the following:

1. Clinically recognized skin or soft tissue infection

2. Culture (+) for MRSA (includes antibiotic susceptibility tests)



Results

CA-MRSA outbreaks at Ft. Benning have been cyclical with an earlier onset and intensity each successive year. **Figure 1**

Rates peaked at 5.6 cases per 1000 AD soldiers in July of 2004 as compared to a peak of 2.3 cases per 1000 AD soldiers in September 2003. Additionally, rates reported from Jan – Mar 2005 are already well above those reported in 2004 during the same time period. **Figure 2**

Cases were predominantly male, 22 years of age on average. A clustering of cases was noted with roughly 2 out of three cases associated with 7 units. **Table 1**

Wounds commonly occurred at the knees and elbows. Approximately 12% of infections were serious enough to warrant hospitalization. **Table 2**

Approximately 11% of infections were reported by cases as spider or insect bites; 40% of patients were prescribed Keflex which is ineffective against MRSA and many more were either prescribed nothing or antibiotics that were ineffective. **Table 2**

All isolates tested were 100% sensitive to the recommended MRSA treatments (vancomycin and trimethoprim-sulfamethoxazole). The sensitivity pattern observed appears to be reflective of that described in the medical literature to include resistance to penicillins and cephalosporins. **Table 3**

Figure 1. Fort Benning MRSA Outbreaks

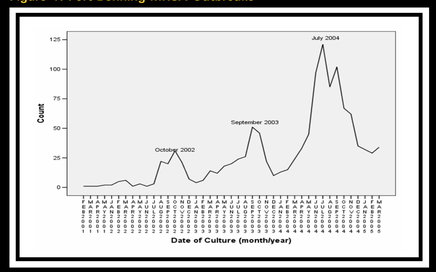
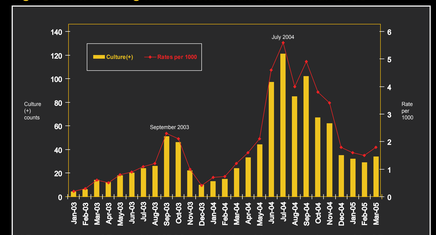


Figure 2. Ft. Benning MRSA Rates, Jan 2003 – Mar 2005



*Rates based on AD monthly MRSA confirmed positive cultures by monthly AD Ft. Benning population as derived from M2 (DEERS summary data)

Table 1. MRSA Case Demographics (N = 1040)

Age:	
<25	801 (77.1%)
25-34	200 (19.4%)
35+	40 (3.4%)
Mean: 22.2 +/- 5.2	
Range:17-49	
Gender:	
Male	1018 (98%)
Female	22 (2%)
Unit (Battalion):	
2/19	138 (13.2%)
2/58	125 (12.0%)
30 AG	106 (10.2%)
CADRE	100 (9.6%)
2/54	91 (8.8%)
1/50	75 (7.2%)
1/19	70 (6.7%)
Other	335 (32.2%)

Table 2. MRSA Infections (N = 1174)*

Wound Locations:	
Lower Extremity (predominantly knees)	445 (38%)
Upper Extremity (predominantly elbows)	326 (28%)
Genitals/buttocks	117 (10%)
Head/Neck	82 (7%)
Torso/Back	73 (6%)
Mean number of wounds: 1.4 + 0.8 (Mode = 1; Range: 1- 9)	
Hospitalizations:	
Infections requiring hospitalization	146 (12%)
Total days admission: 624	
Mean days admitted: 4.3 + 3.0 (Mode = 3; Range: 1-33)	
Clinical findings:	
Patient reported spider/insect bites	129 (11%)
Top 5 antibiotic prescriptions:	
Keflex (Cephalexin)	468 (40%)
Clindamycin	241 (20%)
Septra (Trimethroprim-sulfamethoxazole)	176 (15%)
Ancef (Cefazolin)	157 (13%)
NONE PRESCRIBED	161 (14%)

*Multiple infections observed; 1-3 positive cultures per case

Table 3. Antibiotic Susceptibility (# of Isolates tested):

OXACILLIN (1174) 100% Resistant	CEFAZOLIN (1172) 98.2% R 1.6%S 0.2%I	GATIFLOXACIN (760) 86.1%S 17.9%I 0.5%R
AMPICILLIN (1174) 100% Resistant	CEFIPIME (263) 97.0%R 1.1%I 0.9%S	TETRACYCLINE (1174) 87.9%S 9.7%R 2.4%I
CEFUROXIME (165) 100% Resistant	IMIPENEM (1172) 96.8%R 3.2%S 0.1%I	CLINDAMYCIN (1085) 90.7%S 8.5%R 0.8%I
TICARCILLIN CLAVULANATE(5) 100% Resistant	AZITHROMYCIN (1009) 89.7%R 9.8%S 0.5%I	AMIKACIN (165) 93.3%S 5.5%I 1.2%R
PENICILLIN (1174) 99.7%R 0.3%S	ERYTHROMYCIN (1173) 84.1%R 13.1%S 2.8% I	GENTAMYCIN (1099) 93.6%S 5.1%R 1.3%I
AMOXICILLIN-CLAVULANATE (1173) 99.2%R 0.8%S	CLARITHROMYCIN (5) 60.0%S 40.0%R	CHLORAMPENICOL (1154) 98.4%S 0.9%I 0.8%R
AMPICILLIN-SULBACTAM (1172) 98.4%R 1.1%I 0.5%S	CIPROFLOXACIN (1174) 61.6%S 33.8%R 4.6%I	RIFAMPIN (1174) 99.2%S 0.4%R 0.3%I
CEFTRIAXONE (1167) 98.3%R 1.0%I 0.8%S	LEVOFLOXACIN (1173) 66.8%S 20.1%R 13.1%I	TRIMETHOPRIM_ SULFAMETHO XAZOLE (1174) 100% Sensitive
CEFOTETAN (1172) 98.2%R 1.6%S 0.2%I	**OFLOXACIN (5) 80.0%S 20.0%I**	**VANCOMYCIN (1174) 100% Sensitive**

S = sensitive, R = resistant, I = Intermediate

Limitations

The increased CA-MRSA rates observed may be attributed in part to improved surveillance efforts; it is not possible to determine to what extent the trends noted are influenced by this.

Data to fully assess the impact of MRSA on military personnel considered most at risk, the basic trainee cohorts and AIT cohorts, was not available. Future analyses will attempt to address these potential group dynamics.

Some isolates were not tested for antibiotic susceptibility so the observed pattern is not complete. Continued analysis of susceptibility patterns would illustrate the optimal therapy for the predominant isolate in the trainee populations.

Conclusion

The rise in CA-MRSA cases observed at Ft. Benning is an all too common trend. Other military sites, particularly training posts, as well as civilian communities have experienced similar increases. Management of CA-MRSA requires a team effort and a number of critical public interventions aimed at breaking the chain of transmission and preventing the introduction of new cases. Countermeasures include educating troops to differentiate MRSA infections from insect bites, enforced hygienic practices among trainees, disinfection of common surfaces, and aggressive clinical treatment. Continued and enhanced surveillance to include antibiotic susceptibility testing is also needed to allow identification of the predominant circulating strain and determination of the optimal treatment regimens and potential sources of the outbreak. Future analyses should assess the full impact of MRSA infection in this population as well as the effectiveness of implemented interventions.

USACHPPM
Readiness thru Health

Increases in community associated MRSA cases at Ft. Benning highlight the need for prevention campaigns.